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(54) IMPROVEMENTS IN OR RELATING TO FERRITE-CORED TRANSFORMERS

(71) We, THE MARCONI COMPANY LIMITED, a British Company, of Marconi House, New Street, Chelmsford, Essex. CM1 1PL, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to ferrite transformers and more particularly to high-power high-frequency ferrite-cored transformers.

With ferrite-cored transformers as at present known there is a maximum frequency above which one cannot go at any given power level, and a maximum power level above which one cannot go at any given frequency. The curve connecting these two is not known with precision, as few ferrite-cored transformers have been made for use at high power levels.

The present invention seeks to provide an improved ferrite-cored transformer in which this difficulty is reduced.

According to this invention a transformer is provided in at least two parallel portions each said portion comprises a plurality of conductors which are straight over a substantial part of their length and means for selectively connecting the conductors of each portion together at their ends to form sets of conductors within each portion; means at one or both ends of the portions for connecting a set of conductors in one portion to a set of conductors in another portion so as to provide at least one turn of a plurality of conductors, and at least one discrete ferrite core part encircling the straight part of each said portion.

The invention is illustrated in and further described with reference to the accompanying drawings in which,

Figures 1 and 2 show two views of a transformer in accordance with this invention, and

[*Price 33p*]

Figures 3 to 5 illustrate the features of the transformer of Figures 1 and 2 in greater detail.

Referring to Figures 1 and 2 these show the general arrangement of the transformer, comprising two sub-assemblies 1′, 1″ each consisting of a plurality of conductors disposed within a number of ferrite core parts, and in this case provided with cooling fins. A more detailed description of these sub-assemblies is given later in conjunction with the description of Figure 3.

The two sub-assemblies 1′, 1″, are arranged between two interconnecting and mounting means 2, 3. Each of these means contains provision for cross-connecting selected ones of the conductors in the two sub-assemblies so that the conductors in effect become continuous windings within the transformer. Both the means 2, 3 also optionally provide for mechanical mounting of the transformer. As the mounting details do not form a part of the present invention, no further description will be given of this feature. The means additionally provides terminating means for the transformer windings formed by the interconnections.

Referring to Figure 3, this provides a more detailed view of a portion of one of the sub-assemblies 1′, 1″ of Figures 1 and 2. This figure shows a section of tube 4 containing a plurality of conductors 5. Around the outside of the tube 4 is disposed a plurality of ferrite core parts 6, which may take any convenient shape but which are in this case assumed to be annular. In this case there is additionally provided as an optional feature a plurality of cooling fins 7, which again may be of any convenient shape.

It will be noted that not only are the two sub-assemblies disposed with their longitudinal axes in parallel, but even more importantly, the conductors in each sub-assembly are also disposed in parallel, and,

by suitable choice of the size of tube 4 in relation to the number of conductors, can be arranged to be tightly coupled together.

Referring to Figure 4, this is a cross section through the length of the transformer which shows the tube 4 containing the conductors, the annular ferrite core parts 6 arranged around the tube, and the cooling fins 7.

Referring to Figure 5, this illustrates one example of an arrangement for interconnecting the conductors at each end of the transformer to form the transformer windings. The three illustrations (a), (b) and (c) comprising Figure 5 represent a sequence in which interconnecting plates are placed in position in turn with suitable insulating plates interposed between them. In this example there are nineteen conductors provided in each tube 4. The first interconnecting plate 8 applied in Figure 5(a) forms a common connection between the ends of six of these conductors, represented by the diagrammatic screw-heads 9. A terminal 10 is provided for the common connection. The plate 8 is provided with a cut-out and/or enlarged holes to pass connections to conductors which are to be connected elsewhere.

A second plate 11 with its terminal 12 is then applied, and also interconnects a further six conductors. Finally a third interconnecting plate 13 with terminal 14 makes connection to the remaining seven conductors. It will be seen that with such an interconnecting arrangement at both ends of the transformer, and with a given number of conductors in each sub-assembly, optional interconnections can be provided to provide a wide range of transformer ratios and power ratings. Alternative methods of making these connections may, of course, be used.

In the example just described, the conductors in each sub-assembly are contained within a tube 4. However, although this is a convenient arrangement in that the tube provides a support for the ferrite core parts and heat fins, and may also form one further conductor, cases may arise where the tube is not required. The close arrangement of the conductors provides tight coupling between them and also features a parallel arrangement of the conductors over the important part of their length to minimise arcing.

WHAT WE CLAIM IS:—

1. A transformer provided in at least two parallel portions each said portion comprising a plurality of conductors which are straight over a substantial part of their length and means for selectively connecting the conductors of each portion together at their ends to form sets of conductors within each portion; means at one or both ends of the portions for connecting a set of conductors in one portion to a set of conductors in another portion so as to provide at least one turn of a plurality of conductors, and at least one discrete ferrite core part encircling the straight part of each said portion.

2. A transformer according to Claim 1 wherein at least one cooling fin is circumferentially disposed about each group of conductors.

3. A transformer according to either of the foregoing claims wherein one of the conductors of each group is tubular and the remaining conductors of a respective group are enclosed by said one conductor.

4. A transformer substantially as described herein with reference to the accompanying drawings.

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1385867 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale

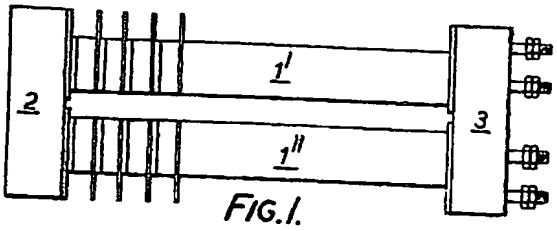

FIG. 1.

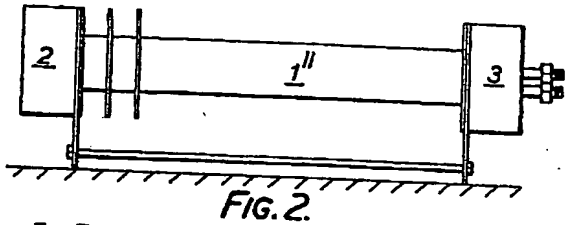

FIG. 2.

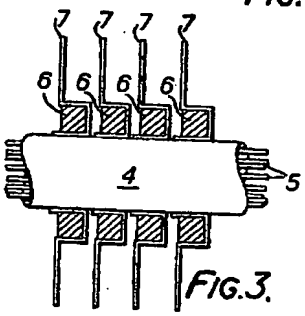

FIG. 3.

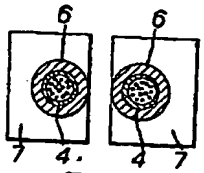

FIG. 4.

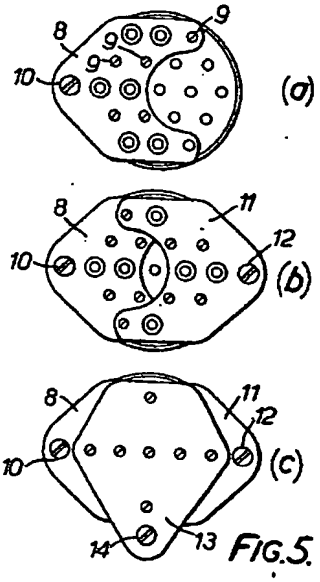

FIG. 5.